

ABSTRACT OF THE DISCLOSURE

The present invention relates to a head injury simulation system; specifically, the ballistic penetration of the skull by a projectile. In one or more embodiments of the present invention, the cohesive theories of fracture, in conjunction with the explicit simulation of fracture and fragmentation, is applied to finite element simulations of firearm injuries to the human cranium. The simulation explicitly reproduces the impact, the nucleation of fracture, the extension of damage, and the scattering of comminuted fragments. In one embodiment, the bullet-skull impact is obtained with an approximated version of a nonsmooth contact algorithm. In one embodiment, the explicit simulation of fracture nucleation and propagation is achieved by a self-adaptive fragmentation procedure. In one embodiment, the progressive decohesion of fractures is modeled by cohesive elements.